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**CREATIVITY MINDFULNESS: THE INCORPORATION OF
LOW-DOSE MINDFULNESS AS A LEADING EDGE
CREATIVE PROBLEM-SOLVING INTERVENTION**

A Research Project

Presented to the Faculty of

The Graziadio Business School

Pepperdine University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science in

Organization Development

by

John A. Cramer

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This research project, completed by

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under the guidance of the Faculty Committee and approved by its members, has been submitted to and accepted by the faculty of The Graziadio Business School in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE
IN ORGANIZATION DEVELOPMENT

Date: June 2019

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Abstract

As organizations continue to feel the pressure to adapt and innovate quickly, creativity has become a crucial factor for success. Mindfulness training may represent a new effective way to facilitate workplace creativity as it may yield substantial benefits in awareness, attitude, and attention that may lead to enhanced creativity. This study explored the perceived effects of low-dose mindfulness training on the cognitive processes of ideation and decision-making on an intact innovation laboratory workgroup, as well as the impact on overall workgroup effectiveness. The participation in a low-dose mindfulness training program for a minimum of four minutes a day for four weeks yielded positive workplace outcomes. Participants described the benefits of improvements in attention and awareness that resulted in positive changes in well-being, interpersonal relationships, and team effectiveness. However, results were mixed and inconclusive on the effect of the mindfulness training on ideation, decision-making, and workplace creativity.

Keywords: creativity, mindfulness, divergent thinking, convergent thinking, focused attention meditation, open monitoring meditation, creative problem-solving, workgroup

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Chapter 1: Introduction

In 2008, McKinsey & Company released a report on a global survey of senior executives which showed that more than 70% believed innovation would be among the top three drivers for growth through the year 2013 (Barsh, Capozzi, & Davidson, 2008). McKinsey & Company replicated this finding in 2010 with more than 2,000 leaders. In the same year, IBM released a survey of over 1,500 CEOs from around the world that reported that creativity was the most crucial factor for success in navigating a world that is moving toward operating as a massively interconnected system of accelerating complexity (“IBM 2010 Global CEO Study,” 2010).

Only six years before the survey, however, an article in the Harvard Business Review suggested that America “is on the verge of losing its competitive edge” of attracting the world’s smartest minds (Florida, 2004). This suggestion came as other countries—Ireland, Finland, Canada, Australia, and New Zealand—continue to invest in higher education and developing creative people. Florida (2004) contends that the “looming shortage” of creative talent is a long-term predicament facing the United States.

Organizational leaders are not the only ones to recognize that the ability to innovate depends on the creative talents of their employees. Institute for the Future published a report which identified three creativity skills (i.e., sensemaking, novel and adaptive thinking, and design mindset) among ten critical skills for the future workforce (Davies, Fidler, & Gorbis, 2011). The Partnership for 21st Century Learning, a coalition of the business community, education leaders, and policymakers, identified creativity among the critical skills listed in their Framework for 21st Century Learning (Partnership for 21st Century Learning, 2007). In 2013, the Association to Advance Collegiate Schools of Business (AACSB) updated its accreditation standards around three themes:

engagement, innovation, and impact. Among the changes introduced into the curriculum content for general business master's degree programs was the addition of thinking creatively (AACSB International, 2013).

Definition of Creativity

Many creativity researchers view creativity as both a process and an outcome (Milliken, Bartel, & Kurtzberg, 2003) and have sought to understand the practices and methods that reliably predict creative outcomes at both the individual (e.g., Pollick & Kumar, 1997; Ruscio, Whitney, & Amabile, 1998; Wallgren, 1998) and group level (Bindeman, 1998). At the organizational level, creativity is "the creation of a valuable, useful new product, service, idea, procedure, or process by individuals working together in a complex social system," (Woodman, Sawyer, & Griffin, 1993, p. 293). Innovation is the implementation of that which is created. However, innovation can also include the adaptation of pre-existing products or services or those produced outside of the organization. Creativity, therefore, can be conceptualized as a subset of the broader domain of innovation, which is categorized as a subset of a more general construct of organizational change.

Creativity can also be expressed contextually in its constituent elements known as the "4 Ps": person, process, product, and press (Rhodes, 1987). In this framework, *person* covers information about personality, intellect, temperament, traits, habits, attitudes, self-concept, value systems, defense mechanisms, and behavior. *Process* applies to motivation, perception, learning, thinking, and communicating. *Product* pertains to ideas which are usually expressed in the form of either language or craft. *Press* refers to the ecological press on the person and upon his or her mental processes (i.e., the relationship

between human beings and their environment). This heuristic distinguishes between creative products, the people who originate them, the places that facilitate creativity, and the process by which it occurs (Kudesia, 2015).

Approaches to Workplace Creativity

Despite the importance of creativity, questions remain about how to best facilitate it in the workplace. Companies have sought various approaches, including hiring talented individuals with critical expertise (Ericsson & Charness, 1994; Weisberg, 1999), implementing policies and procedures that increase employees' motivation to think creatively (Collins & Amabile, 1999; Eisenberger & Shanock, 2003), optimizing climate and culture (Amabile & Gryskiewicz, 1989; Anderson & West, 1998; Ekvall & Ryhammar, 1999), effective structuring of group interactions (Kurtzberg & Amabile, 2001), and identifying essential career development experiences (Feldman, 1999).

A favored approach preferred by organizations is creativity training (Scott, Leritz, & Mumford, 2004). Organizations have implemented various training programs with some degree of success (Cropley, 1997; Nickerson, 1999; Puccio, Cabra, Fox, & Cahen, 2010; Scott et al., 2004). Designed to foster "creativity on demand," these approaches democratize creativity by making creative thinking "predictable, teachable, repeatable, and accessible for all, not just for the gifted few" (Puccio et al., 2010, p. 153). Although differences exist within training programs in the use of process models to describe creative thought, most creativity training shares a common foundation (Fasko, 2001), laid down by Guilford (1950, 1959) who posited that creativity is composed of two main separable components: convergent and divergent thinking.

Convergent thinking is a process of identifying the one correct or most suitable answer to a well-defined problem. For example, if you were given three words (e.g., shelf, end, worm) and were asked to identify a single word that makes a compound word or phrase with each of the three words, your memory search would systematically narrow, theoretically from all available words to known associations with each word. This would likely lead to a single association common to all three words, which would allow you to arrive eventually at the word *book* (e.g., bookshelf, bookend, and bookworm). In contrast, divergent thinking is the capacity to produce a variety of responses in a context in which more than one answer is correct. For example, if asked to list as many different uses for a book, you would notice instead of directing your mind narrowly, such as to read a book, your mental focus would be relatively unconstrained which would allow a breadth of answers to emerge: doorstep, paperweight, footstool, campfire kindling, fly swatter, weaponized projectile, etc. Creativity requires both processes: divergent thinking allows for many diverse and original solutions, while convergent thinking helps one select and arrive at the most promising one (Puccio, Cabra, & Schwagler, 2017). In workplace creativity, divergent thinking can be seen in terms of taking different perspectives to generate alternative solutions when faced with a problem-solving or decision-making task, whereas convergent thinking can be seen in a group's need to evaluate alternatives and choose one to use or recommend (Milliken et al., 2003).

Mindfulness

As organizations continue to seek more effective strategies for facilitating workplace creativity, mindfulness training may represent a new path. Initially developed by ancient Buddhists to attain enlightenment, practical applications of mindfulness

training have entered the business world in the West, primarily focusing on wellness, stress reduction and attention (Goleman & Davidson, 2017; Good et al., 2016). Interest in mindfulness within the scientific community has grown over the past 40 years (Brown, Ryan, & Creswell, 2007; Dreyfus, 2011; Good et al., 2016) with efforts to clarify understanding of what mindfulness is, its cognitive expressions, and the psychological effects (Brown, Creswell, & Ryan, 2015).

Definitions of Mindfulness and Meditation

Mindfulness can be broadly defined as “receptive attention to and awareness of present events and experience” (Good et al., 2016, p. 117). Mindfulness is a mental state often achieved through the practice of meditation. In contrast to mindfulness, meditation can be conceptualized as “a family of emotional and attentional regulatory training regimes developed for various ends” (Lutz, Slagter, Dunne, & Davidson, 2008, p. 163). Meditation includes myriad varieties of contemplative practice, which focus on different aspects of attention and can impact mental skills in varying ways (Goleman & Davidson, 2017). While much has been learned over the years, the field of mindfulness science is still maturing.

Empirical research regarding the connection between meditation and creativity has been mixed and can be explained, in part, by diverse meditation strategies, proficiency levels, and creativity measurement instruments (Horan, 2009). However, more recent research suggests that certain forms of mindfulness meditation (e.g., focused-attention, open-monitoring) can exert specific effects on creativity by facilitating convergent and divergent thinking. Focused-attention meditation entails the voluntary focusing on a chosen object, which induces a control state that supports convergent

thinking. Open-monitoring meditation involves non-reactive monitoring of the content of experience from moment to moment, which induces a control state that promotes divergent thinking (Colzato, Szapora, Lippelt, & Hommel, 2017; Lutz et al., 2008).

Research Purpose and Significance

This investigation explores whether workgroups who practice mindfulness change how they generate ideas, make decisions, and in overall effectiveness. The relationship between mindfulness and workplace creativity is identified and explored to discover if organizations can promote innovative workgroups by developing mindfulness-based training programs. This process potentially could produce a competitive advantage.

The study examines three phenomena:

1. The impact of mindfulness practice on creative problem-solving
2. The impact of mindfulness practice on the ability to make decisions
3. Overall workgroup effectiveness resulting from the mindfulness practice

This research adds to the scholarly literature related to workplace creativity and mindfulness, which traverses several domains: psychology, neuroscience, consciousness, organization development, and management. To date, there is a limited understanding of how mindfulness directly applies to organizational structures as it relates to enhancing creative ideas and stimulating innovative solutions.

Chapter 2: Literature Review

The creativity literature, and more recently, the research on the secular form of mindfulness meditation, are prolific and fall into general categories. Elemental themes can be found. Since the focus of this study is on the cognitive abilities within the creative process, the attention is on theoretical investigations that concentrate on the mental aspects. Laboratory-based, empirical research shows promise, and this study expands on that research by applying adapted methods to a real-world environment.

Creativity

The academic field of creativity has grown significantly in the past 70 years and has evolved far from where it found itself when Guilford (1950) admonished his audience about the “appalling” neglect of the study of creativity. Today, the literature on creativity is voluminous and continues to grow, with more than 11 journals, countless books, numerous conferences, and a special division in the APA recognizing the construct (Puccio et al., 2017).

Historical Perspectives on Creativity

Since ancient times, philosophers have endeavored to understand creativity from different perspectives. Plato regarded creativity as a mysterious and divinely inspired result which cannot be consciously controlled by individuals (Jowett, 2008). In contrast, Aristotle approached creativity in naturalistic terms, where the creator is a maker who has a preconceived target or *telos* (Hausman & Anderson, 2012). Kant and Benard (2012) considered creativity scientifically inexplicable but traceable to the self-generating activity of the individual rather than some divine source.

In psychoanalytic theory, the literature on creativity has concerned itself with the nature of the motivational impetus for creative activities (Gedo, 1997). Freud (1908) theorized creativity was the result of a sublimated libido. Kris (1950) asserted creativity results from mental processes not from the id, but the ego. Other researchers suggest that creative expression arises out of unconscious conflict, as contrary ideas or patterns of thought are brought together (Koestler, 1966). Other scientists, however, reject the belief that creativity is grounded in conflict, maintaining it is generated as the free play of preconscious symbolic processes in healthy individuals (Kubie, 1961; Rothenberg, 1990).

Some researchers have attempted to define the creative process in terms of component mechanisms, which operate in an inter-connected and recursive manner. These componential frameworks can be described as comprehensive theories of creativity, which combine cognitive and socioenvironmental factors. The “investment” theory of creativity (Sternberg, O’Hara, & Lubart, 1997) consists of six major components: intellectual processes, knowledge structures, intellectual style, personality traits, motivational factors, and environmental context. The componential theory of creativity (Amabile, 1983, 1997) assumes that individuals with normal capacities can produce creative work in some domain some of the time and that their creative behavior can be influenced by social and environmental factors. Amabile (1997) describes three foundational components: expertise, creative thinking, and intrinsic task motivation. Expertise encompasses memory for factual knowledge, technical proficiency, and talents in the target work domain. Creative thinking embodies a cognitive style favorable to taking new perspectives on problems, application of techniques for the exploration of new cognitive pathways, a working style conducive to the persistent, energetic pursuit of

one's work, and certain personality characteristics (e.g., independence, orientation toward risk-taking, tolerance for ambiguity). Intrinsic task motivation means being driven by deep interest and involvement in the work itself by curiosity, satisfaction, or a personal sense of challenge.

Still, other theories of creativity come from various sub-disciplines within psychology (i.e., cognitive, personality, social) and emphasize the role of cognitive mechanisms as a basis for creative thought (Kozbelt, Beghetto, Runco, Kaufman, & Sternberg, 2011). They assume that people are inherently creative, the processes leading to creativity are open to rigorous experimental investigation, and creativity results from ordinary mental processes that are in principle observable (Ward, Smith, & Finke, 1999). A key question debated during the first half of the 20th century was to understand the relationship between creativity and intelligence. Are they the same or entirely distinct? Threshold theory (Runco, 2014) suggests that a relationship possibly exists between the two at certain levels of ability. That is that a minimum level of intelligence (threshold) is necessary for a person to do creative work. Above the threshold, individuals have the potential for creativity, but intelligence does not ensure it. The implication is that intelligence is necessary but not sufficient for creativity. In associative theory (Mednick, 1962), creative thinking is explained as the result of associative processes in memory by which different elements coalesce in new combinations for a useful purpose. Mednick (1962) argued that ideas are generated and chained together and that original ideas come later in a set of responses rather than earlier. Mednick's (1962) research became the foundation for later study on the potential inhibitive impact of experience and expertise in generating original ideas (Runco, Dow, & Smith, 2006).

The “creative cognition approach” (Finke, Ward, & Smith, 1996) emphasizes conceptual combination and expansion, creative imagery, and metaphor to understand how individuals generate ideas and explore their implications in invention and design tasks. Building on this approach and augmented by other research, Nijstad, De Dreu, Rietzschel, and Baas (2010) developed a “dual pathway to creativity” model. They argued that creativity is a function of cognitive flexibility (the ability to generate ideas across many categories and frequent switching among categories) and cognitive persistence (the systematic examination of ideas generated within a narrowly focused number of categories) (Nijstad et al., 2010). Additionally, dispositional or situational variables (e.g., situationally induced positive moods) may influence creativity through their effects on cognitive flexibility, cognitive persistence, or both.

The psychometric theories of creativity focus on measurement, and as such, they inform all other creativity theories (Kozbelt et al., 2011). Two individuals who dominated psychometric work on creativity for decades are Guilford (1950) and Torrance (1974). Guilford (1950) first proposed the distinction between divergent and convergent thinking, which has been supported and confirmed in numerous studies (e.g., Bachelor & Michael, 1997; Mumford, Marks, Connelly, Zaccaro, & Johnson, 1998; Scratchley & Hakstian, 2001; Sternberg & O’Hara, 1999; Vincent, Decker, & Mumford, 2002; Wallach & Kogan, 1965). Guilford (1950) developed various tests to measure divergent thinking abilities such as flexibility (category shifts in responses), fluency (number of responses), originality (uniqueness of responses), and elaboration (refinement of responses). Guilford’s (1950) model of creativity became the framework used by Torrance (1974) to develop a highly successful test adapted across many cultures—the Torrance Test of

Creative Thinking (Torrance, 1974). Guilford's (1950) work has led to further research in identifying cognitive styles that promote creative thinking by combining various cognitive functions and personality attributes with divergent thinking. This research includes: creative associating and the use of abstract modes of thought (Shouksmith, 1970); breaking mental sets, keeping options open, suspending judgment, using wide rather than narrow categories, and recognizing the importance of new ideas (Amabile, 1983); and, recent ideational theory emphasizing metacognitive and evaluative skills, in addition to the ability to generate original ideas (Runco, 1990).

Creative Insight

Creative insight, or insight problem solving, is a form of creative thinking that results in a problem solution that occurs unexpectedly following an impasse (Schooler, Ohlsson, & Brooks, 1993). An often recognizable effect of insight is the "Aha" experience in which the impasse is suddenly broken, and insight into the solution is rapidly attained. The impasse-insight sequence was first observed by Gestalt psychologists (Duncker & Lees, 1945; Wertheimer, 1959) who invented and studied several such problems. Ohlsson (1992) describes an information processing model of insight problem solving as a series of cognitive micro-processes following two distinct paths which result in insight. One path is a shift in the way that a problem and solution are represented through elaboration (adding information to a representation), re-encoding (rejecting part of the problem representation), and constraint relaxation (changing assumptions about the solution representation). The other path is in the way that knowledge structures informing possible solutions are organized and activated through application (applying an existing knowledge structure to an incrementally novel context),

analogy (transferring an existing knowledge structure to an innovative context), combination (integrating existing knowledge structures to form a new structure), and abstraction (creating a new superordinate concept that defines the relationship between lower order knowledge structures) (Ohlsson, 1992; Schooler et al., 1993). Schooler et al. (1993) found that verbalization of thoughts can interfere with insight problem solving, causing an individual to be more likely to favor working memory manipulation over long-term memory retrieval. If insight problem solving requires the retrieval of nonobvious memory elements, then a reduced emphasis on long-term memory retrieval processes is likely to lower the probability of attaining insight. Metaphorically speaking, verbalization may create so much noise in the "front" of one's mind that one is unable to hear the new approaches that may be emerging in the "back" of one's mind.

Cognitive-Control States in Divergent and Convergent Thinking

Several researchers propose that divergent and convergent thinking require different cognitive-control states (Colzato, Szapora, & Hommel, 2012; Hommel, 2012). They suggest two parameters may be at play: (1) a top-down control on the process that is searching for the solutions(s) of a given creative problem and (2) the degree of mutual inhibition between local and remote alternative representations that compete for selection. Convergent thinking is likely to benefit from strong top-down control as it focuses the search on a very limited set of items that satisfies well-defined criteria and strong local competition as only one solution can be correct. Divergent thinking is likely to benefit from a weak top-down control which expands the search space to trigger many items that satisfy loosely defined criteria, and weak local competition that allows the

individual to “jump” from one thought to another quickly and easily in a weakly guided fashion (Colzato, Szapora, & Hommel, 2012; Hommel, 2012).

The difference between divergent and convergent thinking suggests a dichotomy, but according to Eysenck (2003), divergent thinking and convergent thinking can be considered as two ends of a continuum. In creative problem-solving, both cognitive-control states are present to varying degrees when executing convergent and divergent thinking tasks. For example, some degree of memory search and “jumping” is involved in the cognitive tasks associated with two widely-used assessment tests: Guilford’s Alternate Uses Test (Guilford, 1968), which measures divergent thinking and Mednick’s Remote Associates Task (Mednick, 1962), which assesses convergent thinking. Convergent components can be found in both tests as the search in each case is goal-directed. Likewise, divergent components are included in both tests as people are likely to consider multiple answers when selecting one correct answer (Hommel, 2012). However, despite the presence of convergent and divergent components in each thinking mode, it is the relative difference these components play that is salient in each thinking mode. To be more specific, the convergent components are more critical than the divergent components when executing convergent thinking tasks, and the opposite is true for divergent thinking (Colzato et al., 2012).

Creativity Process Model

With growing evidence identifying divergent thinking and convergent thinking as critical components in creative problem-solving, creativity scholars began to apply divergent and convergent thinking tasks in the design and development of creative process models and systematic training programs (Scott et al., 2004). One of the most

thoroughly researched creative process models is the Creative Problem-Solving (CPS) model developed in 1953 by the American advertising executive Alex Osborne (Isaksen & Treffinger, 2004). The initial model comprised of three procedures: (1) Fact-finding, (2) Idea-finding, and (3) Solution-finding. Fact-finding calls for problem-definition (problem selection and identification) and preparation (data collection and analysis). Idea-finding calls for idea production (thinking up tentative ideas as possible leads) and idea-development (selecting the most likely of the resultant ideas, adding others, and reprocessing all of these by such means as modification and combination). Solution-finding calls for evaluation (testing and verifying the tentative solutions) and adoption (deciding on and implementing the final solution). Within each procedure of the process, an iterative oscillation takes place between divergent and convergent thinking modes, which Osborn (1979) maintained was necessary to produce creative outcomes. In its more than 60-year history, CPS has evolved undergoing continuous refinement. In its present form, the model is organized into four main stages of operation: clarification (exploring the vision and formulating challenges), ideation (exploring ideas), development (formulating solutions), and implementation (exploring acceptance and formulating plans) (Miller, Vehar, & Firestein, 2001; Puccio, Mance, & Murdock, 2011).

Another popular program, Synectics (Gordon, 1961), is based primarily on the use of analogies. It features a set of thinking tools that assist problem solvers in metaphorical thinking by creating various analogies. The direct analogy refers to thinking of ways similar to how problems in a particular area have been solved. The personal analogy is imagining oneself as the problem. The symbolic analogy uses symbolic images to represent the essence of the problem. The fantasy analogy involves identifying the perfect

and most outrageous solution and then working backward to reach the ideal goal (Puccio, Cabra, Fox, & Cahen, 2010).

A third creativity method is lateral thinking (De Bono, 1990). Lateral thinking is a shift in thinking or perception. It is quite distinct from vertical thinking, which is selective, sequential, and analytical. By contrast, lateral thinking is generative, provocative, and can make jumps. De Bono (1990) argued that both types of thinking are required for creative output. De Bono (1999) later developed another creativity method called The Six Thinking Hats, which also uses techniques to help individuals switch perspectives. Each hat denotes a different thinking perspective a person must assume. For example, the white hat relates to facts and information. The red hat represents the emotional aspects of the situation. The black hat is concerned with critical analysis, whereas the yellow hat relates to constructive thinking, a speculative and possible form of analysis. The green hat invites creative thinking. Finally, the blue hat is most closely associated with meta-cognitive thinking as it focuses on identifying which hat should be used and in what sequence. The hats are designed to promote “parallel thinking” during group problem-solving efforts.

Mindfulness

Mindfulness research has grown at an accelerating rate within psychology, medicine, neuroscience (Brown et al., 2007), and now, more recently, organizational science (Good et al., 2016). From 1970 through 2016, more than 6,800 English language scientific articles on Mindfulness were published, with over 1,100 of them published in 2016 alone (Goleman & Davidson, 2017).

Historical Perspectives on Mindfulness

Mindfulness has its origins with meditation techniques that developed predominantly from ancient Buddhist practices (Hanh & Vo-Dinh, 1987). These techniques were used for managing attention for self-development (Horan, 2009) and enlightenment (Kudesia, 2015). Enlightenment is “a state of subjective experience that... is firmly rooted in an understanding of reality as it is as opposed to some personally or socially constructed reality” (Kudesia, 2015, pp. 195-196). Buddhist philosophy asserts we see the world as we understand it to be, through our own ideas of it. And, it is our interpretations which define who we are and determine our place in the world. Meditation helps us “gradually drop these interpretations until we view what is without imposing any top-down interpretive structures on reality” (Kudesia, 2015, p. 196).

Since the 1970s, as scientific interest in these practices grew in the western world, mindfulness training has been integrated into diverse clinical and psychological applications (Chiesa, Calati, & Serretti, 2011) as a therapeutic adjunct for an array of mental and physical health conditions (Ainsworth, Eddershaw, Meron, Baldwin, & Garner, 2013). Some examples include Mindfulness Based Stress Reduction (Kabat-Zinn, 1990), Mindfulness Based Cognitive Therapy for depression (Segal, Williams, & Teasdale, 2002), Dialectical Behavior Therapy for borderline personality disorders (Linehan, 1993), and Acceptance and Commitment Therapy for behavior change (Hayes, Strosahl, & Wilson, 1999).

In recent decades, mindfulness training has been applied in different ways which has generated numerous and significantly distinctive operational definitions and conceptualizations of mindfulness (Chiesa et al., 2011; Reb & Atkins, 2017). While many

researchers accept Kabat-Zinn's (1990) definition as intentional, nonjudgmental awareness, some focus more on attentional elements (Ainsworth et al., 2013; Kudesia, 2015; Quaglia, Brown, Lindsay, Creswell, & Goodman; 2015), others focus upon aspects of self and identity (Atkins & Styles, 2017), while others view it within a comprehensive, integrated framework (Good et al., 2016). Some see mindfulness as a state (Langer, 1989; Langer & Moldoveanu, 2000), some appear to assume that meditation (Brown et al., 2007; Colzatto et al., 2012; Hölzel et al., 2011; Lutz et al., 2008), and sometimes specifically meditation within the framework of Buddhist understanding (Dreyfus, 2011; Horan, 2009) is the only or best way to attain that state (Reb & Atkins, 2017).

Mindfulness Framework

Lutz et al. (2008) conceptualize meditation as “a family of complex emotional and attentional regulatory training regimes developed for various ends, including the cultivation of well-being and emotional balance” (p. 163). Their theoretical framework, derived from traditional contemplative practices (i.e., Zen, Vipassana, and Tibetan Buddhism) and their clinical secular derivatives in modern neuroscientific conceptions, groups standard meditations into two broad categories: focused attention (FA) and open monitoring (OM) meditation.

FA meditation involves “the voluntary focusing of attention on a chosen object” (Lutz et al., 2008, p. 163). To keep one's focus on the object, the meditator must also monitor the quality of attention moment to moment, recognize when the attention wanders away from the chosen object, and then restore attention back to the object. An example of a chosen object might be the localized sensation of the breath during breathing. A typical instruction for focused attention meditation is:

Find a place where the sensations of your breath are particularly clear right now... at the tip of the nose, the back of the throat, the chest or the abdomen. Make a decision to stay with this place for the duration of this exercise rather than moving your awareness from one place to another. Turn your awareness towards this place, allowing your awareness to settle on this point, allowing the mind to become comfortable here. Maintain this focus, and if the mind wanders, gently return the mind to this place. (Ainsworth et al., 2013, p. 1228)

In contrast, OM meditation involves “the nonreactive monitoring of the content of experience” (Lutz et al., 2008, p. 163) and emphasizes maintaining the monitoring state (i.e., to be attentive moment by moment to anything that occurs in the experience without focusing on any specific object). In this way, OM differs from FA in that it involves no sharp distinction between selection and deselection, and emphasizes the development of a “reflexive” awareness of the usually implicit features of one’s mental life (Lutz et al., 2008). In the following example of a typical OM meditation instruction, the initial focus, as in the previous FA example, is on the breath, however, instead of narrowing the focus onto a single chosen point, the focus expands to include all thoughts, feelings, and physiological sensations within the field of awareness:

Allow a sense of awareness of the breath and physical sensations in the body generally to gradually expand. Allowing your focus to include the sounds that you’re hearing, whatever the eyes see, and perhaps any smells to become within your field of awareness. Sitting here, with all of this, perhaps allowing your emotional tone, how you are feeling right now, to become part of this field of awareness – whatever sense of comfort or discomfort, any emotions you feel right

now, allowing that to become part of your field of awareness right now, noticing any changes that may occur. (Ainsworth et al., 2013)

Mindfulness and Attention

Lutz et al. (2008) reported that, when practiced over time, FA meditation develops three attention regulative skills: (1) a monitoring faculty which remains vigilant to distractions without destabilizing the intended focus, (2) the ability to detach from a distracting object without further involvement, and (3) the ability to redirect focus promptly to the chosen object. With advanced practitioners, FA induces a trait change, whereby minimal effort is necessary to sustain attentional focus for longer periods. This shift reduces the frequency of having to invoke regulative skills and is also associated with a reduction in emotionally reactive behaviors that are incompatible with the stability of concentration (Lutz et al., 2008).

OM practice purportedly leads one “to a more acute, but less emotionally reactive, awareness of the autobiographical sense of identity that projects back into the past and forward into the future” (Lutz et al., 2008, p. 164). Key elements involved in OM meditation include: (1) no explicit focus on objects, (2) nonreactive meta-cognitive monitoring (e.g., for novices, labeling of experience), and (3) nonreactive awareness of automatic cognitive and emotional interpretations of sensory, perceptual, and endogenous stimuli. The study further reports that with regular practice, FA and OM meditation induces an enduring alteration in the default mode of brain functioning.

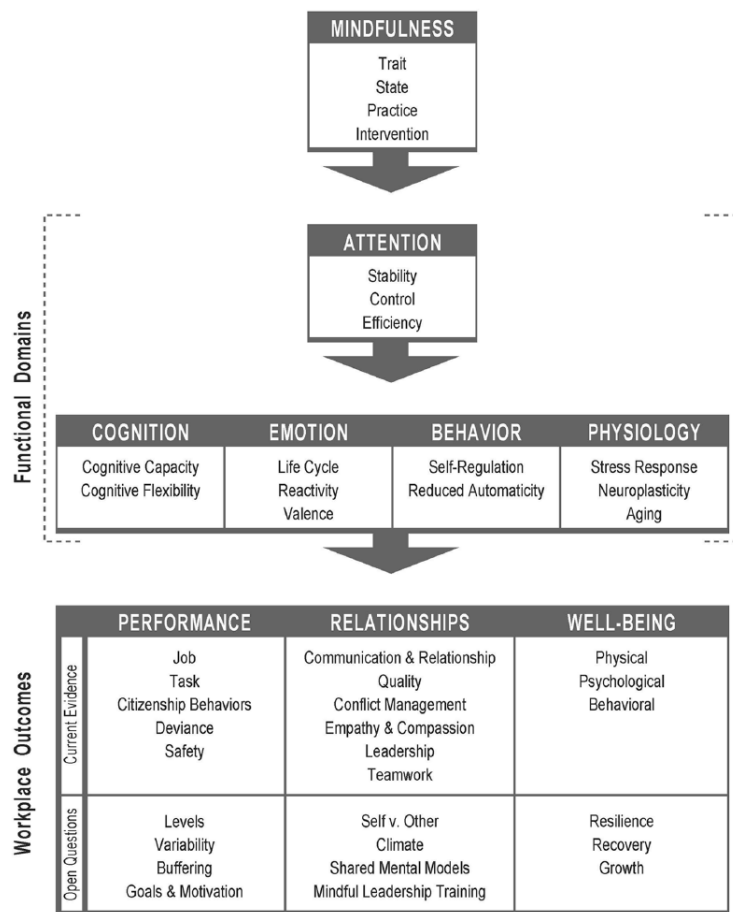
Integrated Framework

Good et al. (2016) reported similar findings which associate mindfulness with improved attentional stability (sustained attention), control (selective attention), and

efficiency (economical use and activation of conflict monitoring resources). These findings support a much larger, integrated framework (Figure 1) which argues that improved attentional performance through mindfulness training and intervention can alter cognitive, emotional, behavioral, and physiological human functioning, which can affect workplace outcomes associated with performance, relationships, and personal well-being.

Figure 1

Integrative Framework Relating Mindfulness to Workplace Outcomes



(Good et al., 2016)

Mindfulness and Cognition

Numerous studies exist within the literature which attempt to measure the effect of FA and OM meditation on cognitive mechanisms and processes. Among these studies there is growing evidence which suggests that mindfulness training can exert significant effects on: (1) attention regulation (Ainsworth et al., 2013; Brown et al., 2007; Cahn & Polich, 2006; Goldin et al., 2009; Hölzel et al., 2011; Manna et al., 2010; Rubia, 2009), (2) sustained attention (Ainsworth et al., 2013; Baer, 2003; Brown et al., 2007; Cahn & Polich, 2006; Jha et al., 2007), (3) selective attention (Brown et al., 2007; Cahn & Polich, 2006; Jha et al., 2007; Hölzel et al., 2011 ; Shapiro, Carlson, Astin, & Freedman, 2006), (4) defocused attention (Brown et al., 2007; Hölzel et al., 2011; Shapiro et al., 2006), (5) cognitive inhibition (Brown et al., 2007; Greenberg, Reiner, & Meiran, 2012; Shapiro et al., 2006), and (6) attention switching (Bishop et al., 2004; Brown et al., 2007; Horan, 2009). Mindfulness training has been shown to lead to a smaller attentional blink effect (a lapse in attention following a stimulus within a rapid stream of presented stimuli) (Hölzel et al., 2011), decreased avoidance and rumination (Kumar, Feldman, & Hayes, 2008), and inhibition of unnecessary elaborative processing (Baer, 2003; Bishop et al., 2004).

Mindfulness training studies have also shown a relationship between mindfulness meditation and two closely related types of executive function abilities: (1) metacognitive executive functions such as problem-solving, abstracting, planning, strategy development and implementation, decision-making, and working memory (Bishop et al., 2004; Horan, 2009) and (2) emotional/motivational executive functions which coordinate cognition and emotion (Ardila, 2008; Raes et al., 2009).

Mindfulness and Creativity

Although early studies researching a creativity-meditation connection presented mixed results, later studies have shown promise in support of an empirical relationship. Horan (2009) compared the impact of various meditation strategies on creativity and argued that meditation, as an attentional mechanism, supports creativity. Horan (2009) further compared creative thinking—viewed as a process that effectively overcomes informational limitations—as “a restricted form of meditation” (p. 200). Meditation training has been shown to enhance cognitive processes, such as the allocation of attentional resources in attention-demanding tasks (Colzato et al., 2012), goal pursuit through improved attentional and motivational properties (Good et al., 2016), and creative incubation and illumination via transcendence and integration, neuropsychological mechanisms common to both processes (Horan, 2009). Horan (2009) maintains that creativity “generates new information that is often discrete and domain-specific, and that transcends informational boundaries, yet is integrated with existing information in a manner exhibiting value” (p. 199).

Studies by Colzato and her colleagues (2012, 2017) measured the effect of FA and OM meditation on creativity tasks which engage convergent and divergent thinking. Colzato et al. (2012) hypothesized that these meditation types would induce particular control states needed to perform convergent and divergent-thinking tasks. Colzato and colleagues (2012) found that OM meditation practice induces a cognitive-control state “characterized by weak top-down biasing of information processing and weak local competition among alternative thoughts” (p. 4), which, in turn, facilitates divergent thinking but not convergent thinking. The results suggest that OM meditation might

restructure the cognitive processing to the degree that facilitates jumping from one thought to another as required in divergent thinking.

Mindfulness meditation has been shown to support elaboration, re-encoding, and constraint relaxation in insight problem solving (Ohlsson, 1992); increased cognitive flexibility (Schooler et al., 1993); higher rates of problem solving (Greenberg et al., 2012); improvement on never-before-seen problems that require re-encoding (Ostafin & Kassman, 2012a); and heightened meta-awareness (Jha et al., 2010; Lee & Therriault, 2013; Mrazek et al., 2013). Creativity outcomes that benefit from mindfulness meditation include: (1) problems requiring shifts in mental representation or knowledge structures, (2) complex problems with many working parts or potential solutions, (3) managing the creative process over time, (4) problems that require combination or abstraction processes, (5) problems that persist over time and require external verification for each potential solution, and (6) seeking out creative problems, accessing diverse information, and thinking flexibly (Kudesia, 2015).

Mindfulness and Creativity in the Workplace

While much of the creativity-mindfulness research focuses on the individual, there is scant literature on the connection between creativity and mindfulness at the workgroup level. Byrne (2017) explored mindfulness training on workgroup creativity and applied current laboratory research in a real-world organizational setting using an intact workgroup. The results suggested that the mindfulness training impacted creativity both in the moment and over time in most measures (Byrne, 2017). Zheng and Liu (2017) found that mindfulness can buffer the negative effects of abusive supervision on employee self-efficacy and creative performance. Connell and Thaarup (2014) examined

the role of mindfulness training on workplace creativity and what is required of an organization to facilitate the optimum context for supporting creativity and innovation through knowledge sharing and transfer.

Opportunity for Further Research

An opportunity exists to increase the small body of applied research aiming to explore the correlation of mindfulness on workplace creativity. This study expands the conversation within the context of a workgroup.

Chapter 3: Research Methodology and Design

The purpose of this study was to explore the relationship between workplace creativity and mindfulness. The extant literature is small but supports links between creativity and mindfulness (Greenberg et al., 2012; Lee & Therriault, 2013; Horan, 2009; Mrazek et al., 2013; Ostafin & Kassman, 2012; Schooler et al., 1993). There have been calls in recent research studies to move beyond confirming the relationship between mindfulness and creativity to conducting experiments that explore the potential benefits of incorporating mindfulness training to workplace creativity (Byrne, 2017; Kudesia, 2015). This study attempts to examine the impact of low-dose mindfulness training on workplace creativity through field research.

Research Sample

The group consisted of various members of an innovation laboratory of a large county public health agency in Texas. The Public Health Innovation Laboratory (PHI Lab) is a hub for public health innovation designed to cultivate ideas into sustainable solutions that improve the health of communities. Through its accelerator program and other initiatives, PHI Lab facilitates program development, creativity, and cross-sector collaboration to address today's public health challenges. The program achieved early success in its first year of operation, and the executive leadership team was eager to explore leading-edge solutions that may positively impact creativity and innovation. When approached for the study, representatives of PHI Lab were excited about the opportunity to pilot a mindfulness training intervention, and the executive leadership team authorized interested employees to participate in the study on company time. However, clear expectations were set that participation would remain voluntary. One

challenge at the onset of the intervention was to find the correct setting within the program that would support the efficacy of a four-week trial. As the daily mindfulness training takes away from team meetings or time where participants could be completing their project tasks, PHI Lab leaders were cautious in selecting a pool of candidates to pilot the study. In consideration of the client work schedule and group level interaction, the decision to deliver the mindfulness training to participants together in a group was ruled out in favor of having participants perform the training individually. Structural support was provided by the innovation lab management to allow participants to engage in the training on their own and at any time while at work.

The study population was limited to active employees of the client organization who worked either as part of an existing workgroup or supervised an existing workgroup in their current job role. This study focused on members of intact workgroups or managers who supervised intact workgroups. Other employee types (e.g., part-time, retirees, terminated, non-active on leave) were excluded from this study. This study also assumed that all eligible participants were English speaking.

Study participants were active, full-time members of the PHI Lab program. Initially, 11 individuals agreed to participate. However, three participants withdrew from the study before the study was completed. The participant sample consisted of eight individuals and was mixed gender—six females and two males. Four organizational levels within the program hierarchy were represented: one administrator, one manager, one team lead, and five members from three innovation project teams. None of the participants had prior experience in mindfulness training or meditation.

Research Protocol

To explore the relationship between mindfulness and workplace creativity, an action research study was conducted using a mixed methods investigative approach. Quantitative tracking data was used to support basic statistical analysis of the daily mindfulness training schedule. Semi-structured individual qualitative interviews and a facilitated focus group discussion were constructed to foster emergent dialogue, offering greater depth in understanding participant experiences (see Table 1).

Table 1

Data Collection Method by Research Question

Research Question	Data Collection Method	Data Collection Point
1. Does mindfulness training impact creative idea generation?	Qualitative, semi-structured face-to-face interview by the principal researcher with the individual study participant	After the study period
2. Does mindfulness training impact the ability to make decisions?	Qualitative, semi-structured face-to-face interview by the principal researcher with the individual study participant	After the study period
3. Does mindfulness training impact overall workgroup effectiveness?	Qualitative, semi-structured focus group discussion with all study participants facilitated by the principal researcher	After the study period and completion of interviews
Additional Information required to track participant engagement level and fidelity to the study:		
4. Tracking of mindfulness training progress	Quantitative self-reporting by the individual study participant	Daily throughout the study period

Instruments

The daily mindfulness practice consisted of two alternating guided meditations: Meditation A (OM) and Meditation B (FA). Both meditation types were included in the design of the mindfulness training to test if a low-dose application of these two forms of meditation might impact how study participants ideate and make decisions. The meditation scripts were based on scripts used in previous studies (Ainsworth et al., 2013; Nolan, 2017). The language was slightly modified and adjusted to ensure consistent delivery. Identical opening and closing statements were constructed to provide a standard container for both meditation scripts, while the middle section of each script consisted of text specific to the given meditation type. (See Appendix A and B for the full text of both meditation scripts).

Participants were instructed to maintain a tracking log instrument (Appendix C) to record the time and date of each mindfulness practice session performed during the study period. In addition to the date and time, the participants were to log the meditation type they listened to, whether the four-minute session was completed, and the length of time spent meditating.

Procedure

Initial discussions with the client executive and director helped to identify a pool of potential participants within PHI Lab as well as other departments within the organization. Recruitment flyers were posted in common areas within those departments. Those interested in participating contacted a client manager who collected the names and invited them to attend an hour-long kickoff meeting that was conducted in two sessions.

The kick-off meeting consisted of a brief welcome and overview of the study purpose, a review of the informed consent form, and training instructions for the daily mindfulness practice and tracking log. Additionally, attendees were allowed to listen and experience both guided meditation recordings together as a group. A short question and answer period followed. At the close of each kick-off meeting, attendees who wished to participate in the study were requested to sign and return the consent forms within two weeks.

The second phase of the study involved the implementation of the daily meditation practice. The two meditation scripts were recorded by a professional actor at a commercial sound studio and were four minutes in duration. The recordings were stored electronically in a MPEG-1 Audio Layer-3 (MP3) file format. Participants were able to download both meditations via a secured, shared access network folder and save them on their mobile devices and desktop computers. Using the recorded MP3 files, participants were instructed to listen to the guided meditations each work day, alternating between Meditation A and Meditation B. The trial period ran for 26 calendar days over a four-week work period. Participants were instructed to meditate at least five times each week for a total of 20 sessions, which would result in approximately 80 minutes of total meditation minutes per participant. Participants were aware they were listening to two different guided meditations, but they were not given any explanation as to why there were two different meditations, nor was it disclosed how these meditations were possibly connected to creative thinking, idea generation, or decision-making until after the study was completed.

For the third phase of the study following the four-week intervention, semi-structured interviews were conducted with participants. The interviews were designed to allow open-ended questions and encourage participants to describe their experience during the trial. It must be noted that, because the term “creativity” can have so many meanings to so many people, the word itself was avoided in the questions posed directly to the participants. Instead, the questions focused on three main areas: (1) overall experience, (2) ideation, and (3) decision-making. After all of the interviews were completed, the researcher conducted a focus group session with all of the participants to discuss and describe any impacts on the group as a whole perceived by the group as being a result of the mindfulness practice.

To protect the names and identities of the participants, data security measures were taken to ensure confidentiality during and after the study. The names and identities of the participants were maintained and stored only in the participant master file (Appendix D). The master file contained a cross-link of the participant name to a unique three-digit participant identification number, which was used in all other data collection forms, including the individual daily practice tracking log, interview notes, audio recordings, video recordings, and the transcription documents of the interviews and focus group session.

Chapter 4: Results

The purpose of this study was to explore the relationship between mindfulness and workplace creativity. Though research continues to expand which examines the benefits of mindfulness and creativity in the workplace (Byrne, 2017; Holm, 2015; Kudesia, 2015), this study explored the perceived impact of a low-dose mindfulness training program on workplace creativity. By conducting a four-week intervention incorporating a low-dose mindfulness program within an innovation laboratory, this study offered *prima facie* evidence of the potential to use mindfulness as a proactive tool for increasing workplace creativity.

Summary of Quantitative Statistics

Over the 26-day trial period, eight participants self-reported their daily mindfulness practice on individual tracking logs, recording the date and time of each session, the meditation script they listened to (A or B), whether they completed the four-minute session, and the total duration of the session (whether they completed it or not). Upon completion of the study, each tracking log was collected and analyzed. The aggregate data generated the following statistics (see Table 2).

Table 2***Meditation Minutes by Participant***

Part. ID	Total Meditation Sessions (A+B)	Meditation A (OM)		Meditation B (FA)		Total Meditation Minutes	Avg.Minutes per Session	St. Dev. Minutes per Session
		Total Sessions	% of Total Sessions	Total Sessions	% of Total Sessions			
101	24	12	50.0%	12	50.0%	84	4	0
104	19	9	47.4%	10	52.6%	76	3.89	0.45
107	21	11	52.4%	10	47.6%	68	4	0
110	18	10	55.6%	8	44.4%	74	4	0
111	19	11	57.9%	8	42.1%	84	4	0
112	21	11	52.4%	10	47.6%	72	4	0
115	17	9	52.9%	8	47.1%	96	4	0
116	16	8	50.0%	8	50.0%	64	4	0
Total N=8	155	81	52.3%	74	47.7%	618	3.99	0.16

The total number of meditation sessions per participant ranged from 16 to 24, with a sample average of 19.38 sessions ($SD = 2.56$). Of the 155 sessions performed in the study, 154 were reported as completed (99.4%), each lasting four minutes in duration. Only one session, two minutes in length, was marked as not completed. The total meditation minutes per participant ranged from 64 to 96, with a sample average of 77.25 ($SD=10.30$). Participants were instructed to alternate each day between two meditation scripts. Meditation A accounted for 48% (75) of the total sessions, and Meditation B accounted for 52% (80).

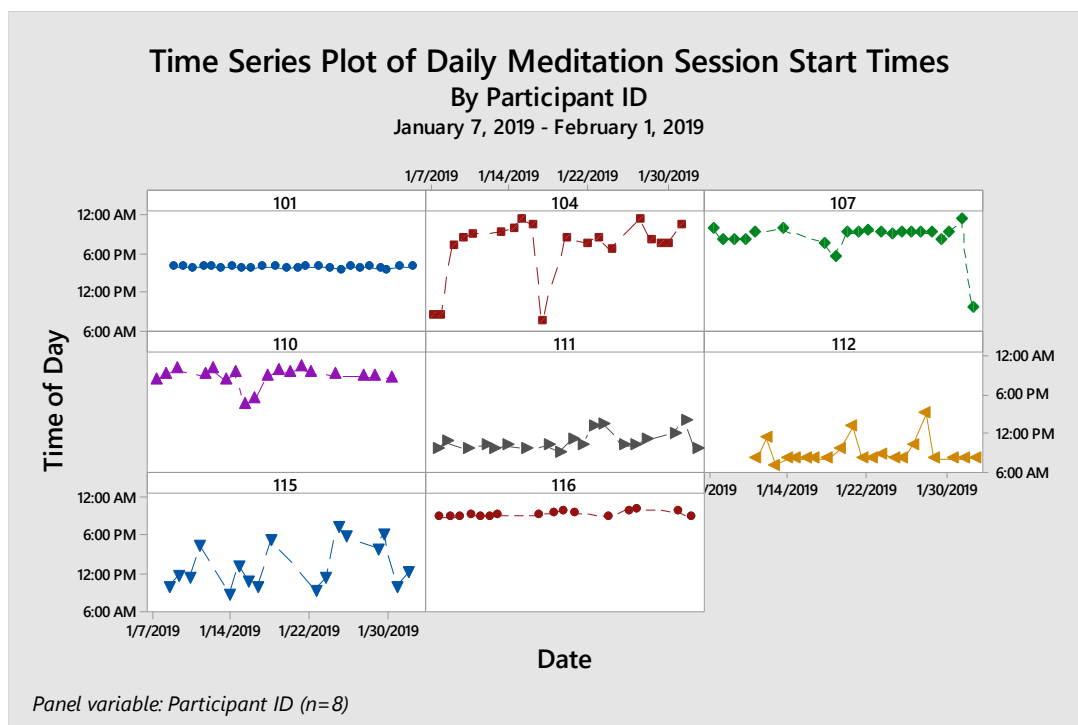
The findings confirmed a fundamental assumption of the research design: overall, participants engaged in a consistent, daily four-minute mindfulness practice, which alternated equally between two meditation scripts.

Sessions took place throughout the day and evening across the sample population. One participant reported meditating exclusively in the evening (6:00 PM – 12:00 AM),

while another exclusively in the afternoon (2:00 PM – 6:00 PM). For three participants, meditation sessions occurred mostly in the evening with occasional sessions taking place in the morning (6:00 AM – 11:00 AM), while two meditated mostly in the morning with occasional sessions taking place at midday (11:00 AM – 2:00 PM) or the afternoon. Only one participant recorded session times occurring across the morning, mid-day, afternoon, and evening periods (Figure 2).

Figure 2

Meditation Session Start Times by Participant



Overall Experience

The initial set of interview questions asked participants to reflect on their overall experience participating in a four-week mindfulness training program and to describe perceived changes in themselves, which they could attribute to the training. Responses

fell into two distinct areas: reactions to the meditation practice itself and the benefits and challenges experienced as a result of the practice.

There were varying reactions to daily meditation practice. One respondent found the daily practice easy to do, while another wished the individual sessions lasted longer. Three respondents expressed difficulty starting the practice during the first week of the trial. The challenge for two of them was trying to find the right time of day to do the practice. For the third, it was making the daily practice a priority over other tasks. All three respondents acknowledged that after making adjustments during the first week, doing the meditation became easier each day. Still, another respondent described a much different experience where the daily practice became more challenging to do over time:

For the first two weeks. . . I could stay very focused. . . . But on the last week of it, it became a very huge struggle. About three or four times when I was doing the meditation, my mind kept wandering everywhere. It became a lot harder trying to get it to stay in one place.

Perceived benefits were organized into four types: physical, cognitive, emotional, and psychological. At a physical level, there was an unanimous consensus from the participants that the mindfulness training resulted in feelings of relaxation and reduced stress. Among the detailed descriptions offered by the respondents, certain words and phrases supported a common refrain: “less stressed,” “calmer,” and “relaxed.” One respondent described the feeling of calmness that comes from drinking a hot cup of herbal tea. Another respondent, who at first admitted skepticism whether four weeks would be enough time to see a significant change, acknowledged seeing a small difference in feeling more relaxed.

Other physical changes reported by the participants included feeling more refreshed immediately after a session, falling asleep more easily at night, having more energy in the morning, and, in one instance, the disappearance of a persistent headache: “It was a long day, and I had a really bad headache . . . [and] after I did the meditation I was able to relax, and my headache went away. I just thought that was really neat.”

At a cognitive level, participants described concentrative and attentional changes (i.e., experiencing moments of greater mental focus and clarity, greater awareness, improved self-control, and self-monitoring). Several participants reported less mind-wandering, better present awareness, and a heightened ability to bring back one’s attention to the present moment when focusing on a work task. Another change noted was a better ability to inhibit irrelevant interfering external and internal activity. For example, keeping thoughts at bay, being able to sit back and think first rather than reacting, and spending more time on self-reflection. One respondent noted a shift in consciousness: “Sometimes. . . I’m able to put myself in the space where it’s more like clear water, and I can stay there for a while.”

At an emotional level, participants noted a positive change in mood and attitude which they attributed to the meditation sessions, as reflected by the comments of one respondent: “Although it was introduced in the workplace, the benefits from it spilled over into everything else. I would say that my attitude is better”.

At a psychological level one participant described an enhanced overall psycho-emotional balance and sense of well-being: “It’s allowed me the opportunity to start balancing myself out a bit. . . and make myself a better person to engage [with] than I was yesterday or, probably than I was ten minutes ago.”

Although respondents in each case acknowledged receiving some benefit from the daily practice, several also reported having negative experiences. During one particular meditation session, a respondent described being emotionally triggered:

I remember in one of the meditations that I did, she [voice in the audio recording] mentioned about letting your emotions . . . or something like that, and I remember feeling emotional when she said that, and then I quickly was aware of my emotions and I stopped. . . . I almost blocked the playing because I didn't want to cry.

Another respondent experienced unexpected memory loss, but was uncertain the experience was a result of the mindfulness training:

I was becoming very forgetful which I am not. . . . Usually, I am very good at remembering things. . . . But during this time, I wasn't doing that. I was just letting go of things very easily. . . . I don't know if that had anything to do with it, but that is something different that I noticed that hadn't happened before.

Perception of the Meditation Scripts

The second question focused on how participants experienced the alternating meditations that were part of the training. Did participants find one of these meditations easier to do than the other or were they both about the same? This question was asked to uncover unconscious bias or developed skill in the associated cognitive functions.

Five of the participants (62.5%) stated that both meditation scripts seemed to be the same. Only three described differences. One found Meditation A (OM) to go by quicker than Meditation B (FA) (even though Meditation A was, in fact, five seconds longer in duration than Meditation B). A second expressed a preference for Meditation A:

It was easier for me to go with the flow. . . . The second one, I didn't really understand what the meditation wanted me to do, like, focus on a certain part of your body. I really didn't understand how to do that. That one was a little tougher for me. . . . I think the first one I enjoyed a lot better.

The third expressed a preference for Meditation B:

One did feel easier to me. It was Meditation B. Meditation B was the one that had you focus on a specific part of your body where you feel the breathing most. . . like the tip of your nose, your chest, your lung, wherever that may be. For me, it was the tip of my nose. I find that one a little easier to focus on because you're just focusing on a part of yourself and where the air was coming from. It's something you can feel and something you know you can pinpoint at all times.

Similarities and differences between how participants perceived Mediation A and Mediation B can be seen in Table 3.

Table 3

Similarities and Differences Among Study Participants

Part. ID	Was one of the meditation scripts easier to do than the other or were they the same? (A=OM, B=FA)
101	Same
104	Same
107	A seemed to go faster than B and B was more relaxing than A
110	Found A easier
111	Found B easier
112	Same
115	Same
116	Same

Impact on Ideation and Divergent-Thinking

The second set of questions focused on ideation and divergent-thinking. One question asked participants to describe how ideas would typically come to them prior to the study. This question was intentionally broad in scope to allow for a wide range of responses relating to various types of ideation tasks (e.g., brainstorming and divergent-thinking) (Nijstad et al., 2010). It served to establish a baseline to compare against the follow-up question whether participants noticed a change in how they generate ideas as a result of the mindfulness training.

Individual responses varied widely and can be described using a heuristic consisting of three aspects of ideation: (1) the speed in which ideas are generated, (2) the fluency, or volume, of ideas generated, and (3) the effort involved to produce them. Regarding speed, participant responses clustered around two distinct points. Ideas were said to be generated either quickly—if not instantaneously—or slowly. At one extreme, one respondent described ideas as “blurbs” which come all at once. At the opposite extreme, another noted that creative ideas “take a while to marinate.” Regarding fluency, responses again fell into two discrete groups: those who typically can generate lots of ideas and those who generate only a few. Regarding effort, some participants described their ideation process as “easy,” “natural,” and “flowing,” while others described having to persist through an effortful, systematic process before arriving at an idea. Several respondents noted they typically experience a sudden insight that would surface unexpectedly while engaging in unrelated activities, often times undertaken outside of work (e.g., driving, showering, exercising, shampooing one’s hair, brushing one’s teeth).

Participants were then asked if they noticed any changes to how ideas come to them as a result of the daily meditation. Only three of the eight participants (37.5%) reported a change in how they generate ideas as a result of the mindfulness training. All three described being able to generate ideas more quickly. Interesting to note were the apparently unrelated ways each of these three participants typically ideate. One participant described typically taking time and creating space to ponder a problem. The change experienced was an intensification of the process—i.e., being able to quiet the mind quicker, more often, and with less effort—which allowed ideas to surface sooner. The second participant described a more systematic and effortful ideation process which required the collection and processing of a lot of information before an idea could be generated. The change experienced by this participant was the same as for the first participant (i.e., enhanced ability to quiet the mind to allow ideas to surface). The ideation process of the third participant was, yet again, different than the other two. This participant described a process where many ideas rush in all at once, followed by a deliberate secondary process to identify as many alternate uses for the ideas as possible. The perceived change described by this participant was an improved faculty in the secondary process to discern higher quality ideas from the pool of ideas generated, and to distinguish them more quickly. This could suggest heightened convergent thinking skills that affect prioritization and decision-making. In all three examples, the changes resulted in arriving at an idea sooner, but from three entirely different starting points.

Five of the eight participants (62.5%) reported experiencing no difference due to the mindfulness training. Included in this group were three participants who described receiving their ideas typically through sudden insight, along with one participant who

methodically allowed sufficient time for ideas to “marinate,” and one participant who tends to generate many ideas at once. No detectable pattern could be determined, except for the group of participants experiencing insight, which could be explained as a coincidence or as a cognitive process distinctly different from divergent thinking, which was unaffected by the training. These associations raise more questions than answers and help set the stage for future research. See Table 4 for a summary of the ideation findings.

Table 4

Summary of Ideation Findings

Part. ID	Ideation prior to training			Changes experienced
	Speed	Fluency	Effort	
101	Slow (need time for reflection)	Low	High	Less effort required to quiet the mind, more opportunities to reflect
104	Immediate	Very high ("fifty million ideas")	Low	None
107	Slow (need time to "marinate")	Low	High	None
110	Immediate (while doing other tasks)	High	Low	None
111	Slow	Low	High	Less time for ideas to emerge
112	Slow	High	High	Less effort required to evaluate emerging ideas
115	Immediate (while doing other tasks)	Low	Low	None
116	Immediate (while doing other tasks)	Low	Low	None

When analyzing all the responses, it appears that participants who experienced a change all described individual ideation processes which could be characterized as slow, effortful, and producing a low volume of ideas, while participants who ideate either by

apparent divergent thinking skills (i.e., immediate, high volume, and effortless) or insight appeared unaffected by the training.

Impact on Decision-Making

The third section focused on decision-making. One question asked the participant to describe how they would typically make decisions prior to the study. Similar to the question set about ideation, this was to establish a baseline to compare against the follow-up question whether they noticed a change in how they make decisions as a result of the mindfulness training.

Two broad categories emerged regarding how the participants typically make decisions: (1) the method for evaluating solution options and (2) the speed and effort of the decision-making process. A number of strategies were described in evaluating options. These involved executing mental techniques (e.g., the “five whys”), using visual tools (e.g., side-by-side comparisons of options presented in written format), and seeking input from others (e.g., trusted work colleagues and family members). While the evaluation method varied with each participant, the overall decision-making process described by each of them could be characterized as slow, deliberate, and requiring great effort.

The participants were evenly divided. Half experienced changes in their decision-making, while the other half reported experiencing no difference. The changes that were described included being able to retain more ideas and information in working memory while problem solving and taking time to reflect and consider the problem from different perspectives before rendering a judgment. One respondent reported an increased level of

confidence in relying on intuition: "I notice that I stick to my gut a lot more. . . I don't think about anything else. This is it, and this is what I'm gonna go with it."

Of the four who reported no difference in their decision-making, one stated beginning to seek more input from others before making a decision, but was not sure that it could be attributed to the meditation training or the environment or the type of decisions that needed to be made. Table 5 shows a summary of the responses to decision-making

Table 5

Summary of Participant Responses to Decision-Making

Part. ID	Typical thinking process prior to training		Changes experienced
	Evaluation method	Speed and Effort	
101	Write options down on paper and compare	Slow and effortful	None
104	Typically, indecisive; emphasis on prioritization	Slow and effortful	More effective prioritization
107	Get input from others, then prioritize	Slow and effortful	Can make decisions "faster and better"
110	Write options down on paper and compare	Slow and effortful	More decisive in making decisions ("I stick to my gut more")
111	Evaluate options based on need and justification	Slow and effortful	None
112	Mental "5 whys" technique	Slow and effortful	More consideration of other points of view
115	Mental "risk analysis" of the benefits	Slow and effortful	Increased mental focus and better decisions
116	Slow, deliberate process, avoid making sudden decisions	Slow and effortful	None

Further analysis of the participants who reported a change showed no detectable pattern or relationship with the participants who experienced a change in ideation, a change in decision-making, a change in both, and no change at all (Table 6).

Table 6

Summary of Changes in Ideation and Decision-Making by Participant

Part. ID	Changes in Ideation	Changes in Decision-Making
101	Less effort required to quiet the mind, more opportunities to reflect	None
104	None	More effective prioritization
107	None	Can make decisions "faster and better"
110	None	More decisive in making decisions ("I stick to my gut more")
111	Less time for ideas to emerge	None
112	Less effort required to evaluate emerging ideas	More consideration of other points of view
115	None	Increased mental focus and better decisions
116	None	None

Impact on Overall Workgroup Effectiveness

In addition to the individual interviews, all participants took part in a facilitated focus group session where they could describe any perceived impact the mindfulness training had on the overall effectiveness of their workgroup. Several themes came out of the group discussion. One change noted was being more present for others (i.e., doing the meditation during the day allowed one participant the opportunity to refocus, gain mental clarity, and be more present for the others). This was acknowledged and confirmed by the rest of the group. Another change noted by two members of the group who work on the same project team was that there was more clarity around project issues and better team

prioritization of project tasks. Almost all participants acknowledged a shift in team member behavior around considering others' needs in listening to and considering ideas and making decisions. Others described they had found a better way to handle a team task, maneuver, and triage issues, and adapt effectively to unexpected project-related changes and situations.

Other changes observed by the group related to behavioral and attitudinal changes with themselves and with each other. These included: (1) feelings of enjoyment coming to work and having an overall better attitude; (2) having more energy throughout the day; (3) feeling less overwhelmed at work and better able to manage team stress; (4) being more empathetic to others; (5) being more engaged in team discussions and having more space to process and analyze conversations; (6) being more “mellow” at work and observing calmness in other team members; and, (7) taking others into account when prioritizing tasks. One participant summarized the four-week study as “subtle changes with a big impact” and expressed the desire to make the mindfulness practice mandatory.

The participation in a low-dose mindfulness training program for a minimum of four minutes a day for four weeks yielded positive workplace outcomes. Participants described benefits of improvements in attention and awareness that resulted in positive changes in well-being, interpersonal relationships, and team effectiveness. However, results were mixed and inconclusive on the effect of the mindfulness training on ideation, decision-making, and workplace creativity.

Chapter 5: Discussion and Conclusions

Good et al. (2016) examined mindfulness in organizational science and identified key next steps to further advance research on mindfulness. The purpose of this study was to generate new insights within the organizational literature and practice as it related to enhancing creative problem-solving in work environments. This study explored the relationship between mindfulness and workplace creativity in the hope of developing an intervention that would increase creative ideation, decision-making, and workgroup effectiveness.

Specifically, this study sought to examine three phenomena:

1. The impact of mindfulness practice on creative problem-solving
2. The impact of mindfulness practice on the ability to make decisions
3. Overall workgroup effectiveness resulting from the mindfulness practice

Overall, the research findings were encouraging. The 4-week action research study suggested a positive association between mindfulness and individual and workgroup creative problem-solving, and there appears to be more workgroup cohesion after mindfulness training.

This chapter is organized into five sections. The first section describes the theoretical implications of this study. The second section builds on the theoretical implications and offers practical implications of the study. Limitations of this study are then discussed, followed by suggested areas of future study. The final section provides a conclusion.

Theoretical Implications

The research findings suggest participant experiences to be highly consistent with previous research identifying the potential benefits of mindfulness in the workplace (Good et al., 2016). Specifically, using the Integrative Framework Relating Mindfulness to Workplace Outcomes (Good et al., 2016), the demonstrated benefits aligned closely to the framework. In general, participants described positive changes to attention and awareness which influenced cognitive, emotional, behavioral, and physiological effects at work and at home (e.g., greater awareness, mental focus, and clarity; improved self-control and self-monitoring; and enhanced attentional stability). These attentional and attitudinal effects from mindfulness training echo other previous studies (Ainsworth, Eddershaw, Meron, Baldwin, & Garner, 2013; Chiesa, 2013; Hölzel et al., 2011; Lutz, Slagter, Dunne, & Davidson, 2008).

Many participants reported a positive shift in mood and attitude, which led to more positive interpersonal relationships with colleagues and family members. This increase in positive affect from mindfulness training was noted in another study (Grossman, Niemann, Schmidt, & Walach, 2004) and is shown to increase creativity by broadening categorization, thereby creating new connections between ideas (Isen, Daubman, & Nowicki, 1987). The participants also reported improvements in their well-being (e.g., enhanced ability to manage stress, improvement in sleep quality), which was reported in other previous research (Ainsworth et al., 2013; Brown, Ryan, & Creswell, 2007).

Novice-level Practitioners Benefit from Low-Dose Mindfulness Training

All of the study participants described themselves as novice mindfulness practitioners with no prior meditation experience at the start of the study. As beginners, however, they each reported experiencing benefits, which they attributed to the 4-week mindfulness training. A common benefit described by each participant was the feeling of relaxation and reduced stress. This has implications for creativity. One study has presented evidence that suggests that creativity is impaired by stress and negative affect (Shanteau & Dino, 1993). The stress reduction benefits of mindfulness could translate to improved creativity as well.

Many of the participants also reported changes in attention and awareness. These findings support previous research that reported beginners found immediate improvements in attention (i.e., less mind-wandering and better focus) very early on, after just eight minutes of mindfulness practice and with as little as two weeks of practice (Goleman & Davidson, 2017). Indeed, the study participants described similar effects. This finding implies that benefits from mindfulness training can be immediate for beginners. For organizations, this means that meditation could pay off quickly in some ways, even if employees have just started.

Low-Dose Mindfulness Practice Can Impact Individual Ideation

One question going into this study was to ask if OM meditation could stimulate divergent thinking in participants. If so, this would theoretically result in faster and more prolific idea generation with less effort (Colzato, Szapora, & Hommel, 2012). The study results were inconclusive. While three participants described changes that resulted in faster, more effortless idea generation, the others did not. And among those participants

who experienced a change, no evidence was reported of increased fluency in idea generation, a key element in divergent thinking. In short, no evidence of heightened divergent thinking could be fully ascertained.

Although links between these findings and divergent thinking could not be made, the reported changes might be better explained as effects from the FA meditation script and not the OM. All three participants who noted a change seemed to share common attributes in their ideation process (e.g., slow, effortful, low fluency) which suggest an adaptive style and a preference for convergent thinking. The reduction in effort and time in generating ideas are consistent with the attentional benefits derived from FA meditation as reported in other studies (Ainsworth et al., 2013; Lutz et al., 2008).

Another point to consider is the purported progression of the development of attentional skills required by OM practice (Lutz et al., 2008). Before mastering OM, one must master FA meditation. As Lutz et al. (2008) stated, “In particular, the initial use of FA training [is] to calm the mind and reduce distractions. As FA advances, the well-developed monitoring skill becomes the main point of transition into OM practice” (p. 164). Based on this assertion, another explanation for the mixed results might be due to the likelihood that the level of monitoring skill typical of novice meditators may tend to be lower than that of more advanced practitioners. More research must be undertaken to provide clearer answers to these questions.

Low-Dose Mindfulness Practice Can Impact Individual Decision-Making

A second question going into this study was to ask if FA meditation could stimulate convergent thinking in the study participants, which would result in faster and

more efficient evaluation and selection of ideas. The anecdotal, self-reported data seem to support this assumption for half of the sample.

One change that was described was an ability to retain more ideas and information in working memory while problem-solving. This effect is consistent with previous findings that show working memory can be increased by mindfulness training (Jha et al., 2010; Mrazek et al., 2013). Working memory also enables creative modes of thinking (Lee & Therriault, 2013). As mindfulness can improve working memory, so can it increase an individual's ability to employ creative modes of thinking, represent problems and solutions more fully, and organize knowledge structures in new, complex, and creative ways (Kudesia, 2015).

Another change reported by the study participants was in taking time to reflect and consider the problem from different perspectives before rendering a judgment. This effect aligns with Langer's (1989) conceptualization of mindfulness, which identifies openness to different points of view as an important feature. Mindful individuals may see improved creativity because they can selectively access greater information from the external world around them and from their internal mental activity (Kudesia, 2015).

Low-Dose Mindfulness Practice Can Impact Overall Workgroup Effectiveness

A third question going into this study was to ask if a mindfulness intervention could enhance the overall effectiveness and creativity of the workgroup, as ideation and decision-making changes experienced at the individual level could have a compounding, cumulative, and beneficial effect on workgroup performance and cohesion. The focus group discussion data appears to support this assumption as many subtle, but perceived changes to the overall effectiveness of the workgroup were observed and acknowledged

by the workgroup members. These findings are in line with the workplace outcomes identified in the Integrative Framework Relating Mindfulness to Workplace Outcomes (Good et al., 2016) and support the theoretical linkages and cascading connections of mindfulness training, attentional changes, functional domains, and outcomes.

Practical Implications: Targeted Mindfulness Training Specific to Creativity

As organizations continue to feel the pressure to adapt and innovate quickly, mindfulness training may represent a new and effective way to facilitate workplace creativity. Low-dose mindfulness training may yield substantial benefits in awareness, attitude, and attention that may lead to enhanced creativity.

To design a potential mindfulness program, organizations may look to leverage existing structures that may support the implementation of a workplace mindfulness program. For example, an organization may consider making mindfulness a part of routine breaks already given to employees. Many types of mindfulness programs exist which differ in terms of daily and total length of practice, meditation types and techniques, and specific instructions as to how the mindfulness state should be developed and maintained (Chiesa, 2013).

In this study, the focus was to see if low-dose mindfulness training (four minutes daily) could produce benefits that support workplace creativity. While the results appear promising, more questions exist for future research on how to operationalize mindfulness specifically as a creativity intervention.

Risk of Unintended Negative Responses to the Mindfulness Training

The study findings echoed existing research that describes benefits in mood elevation, increased overall psycho-emotional balance, and an enhanced sense of well-

being (Rubia, 2009). However, several participants reported experiencing a negative change in mood, which was triggered by the training. This raises a question about the potential risks associated with a mindfulness training intervention. Introducing a daily mindfulness practice, particularly in extreme cases (e.g., individuals who have a history of trauma), could result in the resurfacing of unpleasant emotional items. Life can offer many distractions which might keep traumatic thoughts at bay, but as meditation works to quiet the mind, there is the possibility of opening up strong emotions that may need professional attention. Organizations should be prepared to offer resources (e.g., Employee Assistance Program phone number, website, HR representative) to advise employees on steps they can take to address their particular situation in these instances.

Limitations

This study had three main limitations.

1. Sample size. A larger sample size, potentially across other project teams and departments, could have provided deeper insights into the effectiveness of the program which would have allowed for more significant conclusions.
2. Duration of study. While a four-week intervention showed some promising results, it is possible that the study could have yielded more extensive findings with a longer study window.
3. Research design. The design captured anecdotal, self-reported findings as the basis for identifying associations between mindfulness training and its alleged effects. While this serves as a nice entry point, a future study with more advanced quantitative and qualitative techniques may be able to uncover deeper connections.

Areas for Future Study

With research exploring the relationship between mindfulness and workplace creativity in its infancy, the current study began to explore the topic, yet many relevant questions remain.

The first consideration for further exploration is to expand the study size which would enable researchers to explore the connection of a low-dose mindfulness training program to workplace creativity outcomes. With an enhanced sample size, researchers may be able to yield both quantitative and qualitative data sets that are significant. Though the data pool of participants in this study yielded positive results in certain instances, a more robust sample would greatly enhance this contribution to advancing current research.

A second idea is to examine the impact of low-dose mindfulness training on workplace creativity while using a control group. This would allow for greater insight into the potential benefits of the mindfulness program. Through the incorporation of a control group in an extended study, results along with individual factors and significant interactions could be more critically analyzed for causality, offering the possible opportunity for calculating and measuring predictable outcome levels based on the critical input factors. Comparison groups could be established by varying daily dosage amount, meditation type (OM versus FA), and baseline versus post-intervention results immediately after the intervention and over time.

Another area for future research is exploring how to integrate mindfulness practice effectively into existing creativity training programs which encourage individuals to alternate between divergent and convergent thinking. Can meditative

techniques specific for creativity be integrated into a broader creativity training program? What would such an integrated program look like? What would the right dosage be to enhance both thinking modes? Could the impact of such an intervention be predicted? In other words, what could an organization expect to realize from such an integrated mindfulness-creativity program?

Though this study demonstrated the positive effects of mindfulness through individual participation, what would be the perceived impacts if the mindfulness training were conducted in a group setting versus an individual? What structural considerations would need to be made by an organization to support an environment that would be conducive for group training? Would group training increase participation and fidelity?

Conclusion

This 4-week study shows encouraging results based on the methodological design applied. The findings indicate an association between mindfulness and individual and workgroup creative outcomes for this small sample. Amid the expansion of mindfulness research and the mainstream focus relating to wellness, stress reduction, and emotional intelligence, this study adds to the enthusiasm in how widely the mindfulness phenomenon can be applied. If future research confirms this study's initial findings, organizations will be able to invest in a relatively inexpensive source to develop their workforce's physical, emotional, and cognitive well-being.

To propel this work forward, a direct connection between mindfulness and financial benefits will need to be articulated. The importance of measuring the outcomes and then relating those findings to increased revenues (or decreased costs) will encourage senior leaders to implement these programs on a broad scale.

Although much more needs to be explored to gain a deeper understanding of the relationship of mindfulness and workgroup creativity, an opportunity exists for organizations to reap the benefits from strengthening their employees' cognitive skills through mindfulness training. Organizations that can do this will have the ability to enhance human potential and develop faster and more effective responses to business opportunities now and in the future.

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Appendix A: Guided Meditation Script A – Open Monitoring

Guided Meditation Script A – Open Monitoring

Duration: 4:05 minutes

Begin by finding a comfortable posture. Lean slightly forward, and back. To one side, and then the other. Find a comfortable balance as you come back to the center.

Close your eyes and rest your hands on your knees. Bring your awareness to the touch of your body on your seat. Feel the weight of your body on your chair.

Take a few deep breaths. While you are breathing deeply, relax your shoulders, your stomach, the muscles in your face, your hands, and your legs. Let go of all the tension in your body (Nolan, 2017).

Allow a sense of awareness of the breath and physical sensations in the body generally to gradually expand.

Allowing your focus to include the sounds that you're hearing, whatever the eyes see, and perhaps any smells to become within your field of awareness.

Sitting here, with all of this, perhaps allowing your emotional tone, how you are feeling right now, to become part of this field of awareness – whatever sense of comfort or discomfort, any emotions you feel right now, allowing that to become part of your field of awareness right now, noticing any changes that may occur (Ainsworth et al., 2013).

Now gently bring your attention back to the touch of your body on your seat, and open your eyes (Nolan, 2017).

Appendix B: Guided Meditation Script B – Focused-Attention

Guided Meditation Script B – Focused-Attention

Duration: 4:00 minutes

Begin by finding a comfortable posture. Lean slightly forward, and back. To one side, and then the other. Find a comfortable balance as you come back to the center.

Close your eyes and rest your hands on your knees. Bring your awareness to the touch of your body on your seat. Feel the weight of your body on your chair.

Take a few deep breaths. While you are breathing deeply, relax your shoulders, your stomach, the muscles in your face, your hands, and your legs. Let go of all the tension in your body (Nolan, 2017).

Find a place where the sensations of your breath are particularly clear right now...at the tip of the nose, the back of the throat, the chest or the abdomen.

Make a decision to stay with this place for the duration of this exercise rather than moving your awareness from one place to another.

Turn your awareness towards this place...allowing your awareness to settle on this point ...allowing the mind to become comfortable here.

Maintain this focus, and if the mind wanders, gently return the mind to this place.

If you find your mind has wandered, lightly and firmly return your focus to this place.

Really examining the sensation of the breath and making the focus of attention as fine and as exact as possible – really pinpoint this one point where the breath is observed.

Now gently bring your attention back to the touch of your body on your seat, and open your eyes (Ainsworth et al., 2013).

Appendix C: Participant Daily Practice Tracking Log

Participant Daily Practice Tracking Log

Creative Thinking and Mindfulness Research Study Daily Tracking Log					
Participant ID Number:					
	Date	Time of Day	Meditation Script (A or B)	Daily Session Completed? (Yes/No)	Total Minutes
Ex:	[12/20/2018]	[8:00:00 AM]	[A]	[Yes]	[4]
	1/7/19				
	1/8/19				
	1/9/19				
	1/10/19				
	1/11/19				
	1/12/19				
	1/13/19				
	1/14/19				
	1/15/19				
	1/16/19				
	1/17/19				
	1/18/19				
	1/19/19				
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	1/21/19				
	1/22/19				
	1/23/19				
	1/24/19				
	1/25/19				
	1/26/19				
	1/27/19				
	1/28/19				
	1/29/19				
	1/30/19				
	1/31/19				
	2/1/19				

Appendix D: Interview Protocol

Interview Protocol

Research Questions	Interview Questions
Individual Interview	
How did participants experience a daily low-dose mindfulness practice?	<p>1. Do you feel any change in yourself as a result of the mindfulness practice? If so, can you briefly describe the change?</p> <p>2. Two different meditations that alternated each day. Did one feel easier to do than the other or were they both about the same? Please elaborate.</p>
Did a low-dose mindfulness practice impact ideation?	<p>3. How do ideas typically come to you?</p> <p>4. Compared to what's typical, have you noticed any change in how ideas come to you as a result of the mindfulness practice? If so, can you briefly describe the change?</p>
Did a low-dose mindfulness practice impact decision making?	<p>5. How do you typically make decisions?</p> <p>6. Compared to what's typical, have you noticed any change in how you make decisions as a result of the mindfulness practice? If so, can you briefly describe the change?</p>
Focus group Interview:	
Did a low-dose mindfulness practice impact group-level effectiveness?	<p>7. Has the mindfulness practice had any impact on the effectiveness of your working group? If so, can you briefly describe?</p>